- PATENT -

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

APPELLANT:	Colin Frank	EXAMINER:	Pan, Y.
SERIAL NO.:	10/670,577	GROUP:	2618
FILED:	09/25/03	CASE NO.:	CE10471R
ENTITLED:	METHOD AND APPARATUS FOR USING SWITCHED MULTIBEAM ANTENNAS IN A MULTIPLE ACCESS COMMUNICATION SYSTEM		

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November 15, 2006

APPEAL BRIEF UNDER 37 CFR 41.37

Mail Stop Appeal Brief - Patents
Commissioner of Patents
P.O. Box 1450
Alexandria, Va. 22313-1450

Commissioner:

The appellant hereby respectfully submits the following Appeal Brief in response to a final Office Action dated February 23, 2006, and a Notice of Appeal filed July 20, 2006.

1. REAL PARTY IN INTEREST

The real party in interest in this appeal is Motorola, Inc.

2. RELATED APPEALS AND INTERFERENCES

There are no other appeals or interferences that will directly affect, or be directly affected by, or have a bearing on the Board's decision in this appeal.

3. STATUS OF CLAIMS

This is an appeal from a final Office Action dated February 23, 2006. Claims 1-5, 10-14, 18-20, and 22-34 are appealed.

In a first Office Action dated August 26, 2004, the Examiner rejected claims 1 and 2 under 35 U.S.C. §102(e) as being anticipated by Dam (U.S. patent no. 6,771,987) and rejected claims 13 and 15 under 35 U.S.C. §102(e) as being anticipated by Keskitalo (U.S. patent no. 5,893,033). The Examiner rejected the following claims under 35 U.S.C. §103(a) as being unpatentable over the following art: claim 3 over Dam in view of Gans (U.S. patent no. 5,987,037), claims 5 and 6 over Dam in view of Sollenberger (U.S. publication no. 2002/0135516), claims 7-9 over Dam in view of Lin (U.S. patent no. 6,360,107), claims 10-12 over Dam in view of Evans (U.S. patent no. 5,920,813), claims 14 and 16 over Keskitalo in view of Dam, claim 17 over Keskitalo in view of Lin, claim 18 over Keskitalo in view of Gans, claims 20 and 21 over Keskitalo in view of Sollenberger, and claims 22-24 over Keskitalo in view of Evans. The Examiner objected to claims 4 and 19 as being dependent upon a rejected base claim but as being allowable if rewritten in independent form to include all of the limitations of the base claim and any intervening claims.

In an Amendment dated February 28, 2005, the appellant responded to the rejections without amending the claims.

In a second Office Action dated June 15, 2005, the Examiner rejected claims 1-3 and 5-9 under 35 U.S.C. §102(e) as being anticipated by Teo et al. (U.S. patent application publication no. 2002/0086708, hereinafter referred to as "Teo") and rejected

claims 13 and 15 under 35 U.S.C. §102(e) as being anticipated by Keskitalo. The Examiner then rejected the following claims under 35 U.S.C. §103(a) as being unpatentable over the following art: claims 10-12 over Teo in view of Evans, claims 14 and 16 over Keskitalo in view of Dam, claim 17 over Keskitalo in view of Lin, claim 18 over Keskitalo in view of Gans, claims 20 and 21 over Keskitalo in view of Sollenberger, and claims 22-24 over Keskitalo in view of Evans. The Examiner objected to claims 4 and 19 as being dependent upon a rejected base claim but as being allowable if rewritten in independent form to include all of the limitations of the base claim and any intervening claims.

In an Amendment dated November 14, 2005, and re-submitted on December 7, 2005, the appellant amended claims 1, 2, 13, 14, and 18, canceled claims 6-9, 15-17, and 21, and added new claims 25-34.

In a final Office Action dated February 23, 2006, the Examiner rejected claims 1-5, 10-14, 18-24, 27-30, 33, and 34 under 35 U.S.C. §102(e) as being anticipated by Mesecher et al. (U.S. patent no. 6,574,271, hereinafter referred to as "Mesecher"). The Examiner objected to claims 25, 26, 31, and 32 as being dependent upon a rejected base claim but as being allowable if rewritten in independent form to include all of the limitations of the base claim and any intervening claims.

A Response to the Final Office Action was filed on July 20, 2006, and is currently pending. In the Response to the Final Office Action, the appellants responded to the Examiner's rejections of claims 1-5, 10-14, 18-24, 27-30, 33, and 34 and objections to claims 25, 26, 31, and 32. No claims were amended. The appellants also filed a Notice of Appeal on July 20, 2006.

In an Advisory Action dated August 3, 2006, the Examiner reiterated the final Office Action rejections of the claims.

The pending claims 1-5, 10-14, 18-20, and 22-34 are reproduced below in the attached Appendix.

4. STATUS OF AMENDMENTS

A Response to the Final Office Action was filed on July 20, 2006, and is currently pending. In the Response to the Final Office Action, the appellants responded to the Examiner's rejections of claims 1-5, 10-14, 18-24, 27-30, 33, and 34 and objections to claims 25, 26, 31, and 32. No claims were amended. An Advisory Action dated August 3, 2006, reiterated the rejections of the claims.

Claim 1, as amended, provided a method for allocating a shared communication channel among a plurality of beams in a communication system comprising a switched beam antenna system, wherein the shared communication channel comprises a plurality of orthogonal codes. The method includes measuring a quality of a propagation channel associated with each beam of the plurality of beams and allocating a first portion of the plurality of orthogonal codes to a first beam of the plurality of beams and a second portion of the plurality of orthogonal codes to a second beam of the plurality of beams, wherein the first and second portions are a function of the measured quality of the propagation channels between a base station and mobile stations in the first beam and between the base station and mobile stations in the second beam.

Claim 13, as amended, provided, in a communication system comprising a switched beam antenna system that generates a plurality of predetermined, fixed beams, a base station subsystem comprising an antenna array, having a plurality of array elements, and a processor. The processor comprises an orthogonal code generator that generates a plurality of orthogonal codes, wherein the plurality of orthogonal codes are allocated to a shared communication channel, wherein the processor allocates a first portion of the plurality of orthogonal codes to a first array element of the plurality of array elements and allocates a second portion of the plurality of orthogonal codes to a second array element of the plurality of plurality of array elements, wherein the processor allocates the plurality of orthogonal codes to the first and second array elements based on a propagation channel quality measurement associated with a first beam of the plurality of fixed beams and a propagation channel quality measurement associated with a second beam of the plurality of fixed beams, and wherein each of the first portion of the plurality of orthogonal codes and the second portion of the plurality of orthogonal codes are transmitted via one or more array elements of the plurality of array elements.

5. SUMMARY OF CLAIMED SUBJECT MATTER

The appellant's invention provides a communication system that comprises a switched beam antenna system and that schedules a different mobile station (MS), or user, in each beam of multiple predetermined, fixed beams associated with a coverage area, in particular a sector, thereby increasing a capacity, or a number of mobile stations (MSs), or users, that may be engaged in concurrent communication sessions. By simultaneously scheduling a user in each beam of the multiple beams, a performance and throughput of the communication system is significantly increased over the prior art. In one embodiment of the present invention, a portion of a shared communication channel that is allocated to each MS is concurrently transmitted to each MS via a beam associated with the MS. In other embodiments of the present invention, voice channels, data channels, and control channels associated with each MS scheduled in a beam may be concurrently transmitted to each MS via the beam associated with the MS.

Claim 1, as amended, provides a method for allocating a shared communication channel among a plurality of beams (401, 402) in a communication system (100) comprising a switched beam antenna system, wherein the shared communication channel comprises a plurality of orthogonal codes. The method includes measuring (110, 111) a quality of a propagation channel (116, 117) associated with each beam of the plurality of beams and allocating (206, 704, 706) a first portion of the plurality of orthogonal codes to a first beam of the plurality of beams and a second portion of the plurality of orthogonal codes to a second beam of the plurality of beams, wherein the first and second portions are a function of the measured quality of the propagation channels between a base station (102) and mobile stations (110) in the first beam and between the base station and mobile stations (111) in the second beam. (FIGs. 1, 2, 4-7; page 8, line 21, to page 9, line 20; page 10, line 10, to page 12, line 21; page 14, lines 2-19; page 15, line 9, to page 18, line 15; page 19, line 19, to page 20, line 10; page 22, line 20, to page 23, line 21)

Claim 13, as amended, provides, in a communication system (100) comprising a switched beam antenna system that generates a plurality of predetermined, fixed beams (e.g., 401, 402), a base station subsystem (102) comprising an antenna array (e.g., 120),

having a plurality of array elements (121, 122), and a processor (206). The processor comprises an orthogonal code generator (304) that generates a plurality of orthogonal codes, wherein the plurality of orthogonal codes are allocated to a shared communication channel, wherein the processor allocates (704) a first portion of the plurality of orthogonal codes to a first array element (e.g., 121) of the plurality of array elements and allocates (706) a second portion of the plurality of orthogonal codes to a second array element (e.g., 122) of the plurality of plurality of array elements, wherein the processor allocates the plurality of orthogonal codes to the first and second array elements based on a propagation channel quality measurement associated with a first beam (e.g., 401) of the plurality of fixed beams and a propagation channel quality measurement associated with a second beam (e.g., 402) of the plurality of fixed beams, and wherein each of the first portion of the plurality of orthogonal codes and the second portion of the plurality of orthogonal codes are transmitted (708, 710) via one or more array elements of the plurality of array elements. (FIGs. 1, 2, 4-7; page 8, line 21, to page 9, line 20; page 10, line 10, to page 12, line 21; page 14, lines 2-19; page 15, line 9, to page 18, line 15; page 19, line 19, to page 20, line 10; page 22, line 20, to page 23, line 21)

6. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

Whether claims 1 and 13 are anticipated under 35 U.S.C. §102(e) by Mesecher.

7. ARGUMENT

(i) Rejection under 35 U.S.C. §112, first paragraph:

None

(ii) Rejection under 35 U.S.C. §112, second paragraph:

None

(iii) Rejection under 35 U.S.C. §102:

The Examiner rejected claims 1-5, 10-14, 18-24, 27-30, 33, and 34 under 35 U.S.C. §102(e) as being anticipated by Mesecher. Specifically, with respect to claim 1,

the Examiner contended that Mesecher teaches a method for allocating a shared communication channel among multiple beams in a communication system comprising a switched beam antenna system, wherein the shared communication channel comprises multiple orthogonal codes (col. 3, lines 20-35) and wherein the method includes measuring a quality of a propagation channel associated with each beam of the multiple beams (col. 3, lines 35-45) and allocating a first portion of the multiple orthogonal codes to a first beam of the multiple beams and a second portion of the multiple orthogonal codes to a second beam of the multiple beams, wherein the first and second portions are a function of the measured quality of the propagation channels between a base station and mobile stations in the first beam and between the base station and mobile stations in the second beam (FIG. 14; col. 6, lines 1-6). The appellant respectfully disagrees.

Mesecher teaches a determination of weights for each version of a multi-path received signal based on error signals associated with pilots that are received via each of the multiple paths. Mesecher nowhere discusses any method for allocating orthogonal codes among beams other than to note that pilot channels and traffic channels may be "sent using orthogonal spreading codes" (col. 8, lines 10-11). The only code distribution taught by Mesecher concerns pseudo-random codes, which codes are not orthogonal to each other, and the distribution pattern taught by Mesecher simply is the assignment of a different pseudo-random code to each antenna.

Furthermore, Mesecher teaches an adaptive beam steering system, wherein a beam is adaptively steered to stay with a mobile station throughout a sector, not a switched beam antenna system, wherein the beams are fixed in their coverage and the mobile station must be switched in and out of beams as the mobile station moves. Nowhere does Mesecher teach method any allocation of a shared communication channel among multiple beams, as the adaptive beams taught by Mesecher have a different channel in each beam. In addition, in an adaptive beam system, the use of channel condition feedback is irrelevant to a scheduling of users and an allocating of bandwidth and, accordingly, nowhere does Mesecher teach any allocation of bandwidth based on channel condition feedback. Therefore, Mesecher does not teach the features of claim 1 of a method for allocating a shared communication channel among multiple beams in a communication system comprising a switched beam antenna system, wherein the shared

communication channel comprises multiple orthogonal codes and wherein a first portion of the multiple orthogonal codes is allocated to a first beam of multiple beams and a second portion of the multiple orthogonal codes is allocated to a second beam of the multiple beams and wherein the first and second portions are a function of the measured quality of the propagation channels between a base station and mobile stations in the first beam and between the base station and mobile stations in the second beam. Accordingly, the appellant respectfully submits that claim 1 is not unpatentable over the prior art of record.

Since claims 2-5, 10-12, and 25-29 depend upon independent claim 1, the appellant respectfully submits that that claims 2-5, 10-12 and 25-29 are not unpatentable over the prior art of record.

Claim 13 teaches a base station subsystem operating in a switched beam antenna communication system that generates multiple predetermined, fixed beams and that includes a processor comprising an orthogonal code generator that generates multiple orthogonal codes, wherein multiple orthogonal codes are allocated to a shared communication channel and wherein the processor allocates a first portion of the plurality of orthogonal codes to a first array element of the multiple array elements and allocates a second portion of the plurality of orthogonal codes to a second array element of the multiple plurality of array elements, wherein the processor allocates the multiple orthogonal codes to the first and second array elements based on a propagation channel quality measurement associated with a first beam and a propagation channel quality measurement associated with a second beam of the multiple fixed beams. As described in detail above, theses features are nowhere taught by Mesecher. Accordingly, the appellant respectfully submits that claim 13 is not unpatentable over the prior art of record.

Since claims 14, 18-20, 22-24 and 30-34 depend upon independent claim 13, the appellant respectfully submits that claims 14, 18-20, 22-24 and 30-34 are not unpatentable over the prior art of record.

(iv) Rejection under 35 U.S.C. §103:

None

For the above reasons, the appellant respectfully submits that the rejections of claims 1-5, 10-14, 18-24, 27-30, 33, and 34 and objections to claims 25, 26, 31, and 32 are in error and should be reversed and the claims allowed.

Respectfully submitted,
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8. CLAIMS APPENDIX

1. A method for allocating a shared communication channel among a plurality of beams in a communication system comprising a switched beam antenna system, wherein the shared communication channel comprises a plurality of orthogonal codes and wherein the method comprises:

measuring a quality of a propagation channel associated with each beam of the plurality of beams; and

allocating a first portion of the plurality of orthogonal codes to a first beam of the plurality of beams and a second portion of the plurality of orthogonal codes to a second beam of the plurality of beams, wherein the first and second portions are a function of the measured quality of the propagation channels between a base station and mobile stations in the first beam and between the base station and mobile stations in the second beam.

2. The method of claim 1 further comprising:

scheduling a first mobile station for the first beam;

scheduling a second mobile station for the second beam;

transmitting the first portion of the plurality of orthogonal codes to the first mobile station via the first beam; and

transmitting the second portion of the plurality of orthogonal codes to the second mobile station via the second beam;

where the first and second portions of the plurality of orthogonal codes are based on the measured quality of the propagation channels between the base station and the first mobile station in the first beam and the quality of the propagation channel between the base station and the second mobile station in the second beam.

3. The method of claim 2, wherein the communication system further comprises a control channel and wherein the method further comprises a step of transmitting the control channel in each of the first beam and the second beam.

4. The method of claim 3, wherein the control channel comprises a first control channel, wherein the communication system further comprises a second control channel that is

associated with the second mobile station and not with the first mobile station, and wherein the method further comprises a step of transmitting the second control channel in the second beam but not in the first beam.

5. The method of claim 2, wherein the communication system further comprises a plurality of voice channels and shared data channel and wherein the method further comprises steps of:

transmitting a plurality of voice channels and a portion of the orthogonal codes corresponding to the shared data channel in the first beam; and

transmitting a plurality of voice channels and a portion of the orthogonal codes corresponding to the shared data channel in the second beam.

6-9. (Canceled)

10. The method of claim 1, wherein the communication system is divided into a plurality of geographic sectors, and wherein each beam of the plurality of beams is transmitted in a same sector of the plurality of sectors.

11. The method of claim 10, further comprising a step of allocating to each beam of the plurality of beams an approximately same proportion of a total transmitted power allocated to the sector that includes the beams.

12. The method of claim 10, further comprising a step of allocating to each beam of the plurality of beams a different proportion of a total transmitted power allocated to the sector that includes the beams than the proportion of the total transmitted power allocated to the other beams of the plurality of beams, where the proportions reflect the average traffic loads within the beams.

13. In a communication system comprising a switched beam antenna system that generates a plurality of predetermined, fixed beams, a base station subsystem comprising:

an antenna array comprising a plurality of array elements;

a processor that comprises an orthogonal code generator that generates a plurality of orthogonal codes, wherein the plurality of orthogonal codes are allocated to a shared communication channel, wherein the processor allocates a first portion of the plurality of orthogonal codes to a first array element of the plurality of array elements and allocates a second portion of the plurality of orthogonal codes to a second array element of the plurality of plurality of array elements, wherein the processor allocates the plurality of orthogonal codes to the first and second array elements based on a propagation channel quality measurement associated with a first beam of the plurality of fixed beams and a propagation channel quality measurement associated with a second beam of the plurality of fixed beams, and wherein each of the first portion of the plurality of orthogonal codes and the second portion of the plurality of orthogonal codes are transmitted via one or more array elements of the plurality of array elements.

14. The base station subsystem of claim 13, further comprising a scheduler that assigns the first beam to a first mobile station and assigns the second beam to a second mobile station.

15-17. (Canceled)

18. The base station subsystem of claim 13, wherein the base station subsystem further transmits a control channel in each of the first beam and the second beam.

19. The base station subsystem of claim 18, wherein the control channel comprises a first control channel and wherein the base station subsystem further transmits a second control channel in the second beam but not in the first beam.

20. The base station subsystem of claim 16, wherein the base station subsystem further transmits a plurality of voice channels and a first data channel of a portion of the orthogonal codes corresponding to the shared data channel in the first beam and transmits a plurality of voice channels and a portion of the orthogonal codes corresponding to the shared data channel in the second beam.

21. (Canceled)

22. The base station subsystem of claim 13, wherein the station subsystem operates in a communication system that is divided into a plurality of geographic sectors and wherein each beam of the plurality of beams is transmitted in a same sector of the plurality of sectors.

23. The base station subsystem of claim 22, wherein the base station subsystem allocates a total transmitted power to the sector that includes the beams and wherein the base station subsystem further suballocates to each beam of the plurality of beams an approximately same proportion of a total transmitted power allocated to the sector that includes the beams.

24. The base station subsystem of claim 22, wherein the base station subsystem allocates a total transmitted power to the sector that includes the beams and wherein the base station subsystem further sub-allocates to each beam of the plurality of beams a different proportion of a total transmitted power allocated to the sector that includes the beams than the proportion of the total transmitted power allocated to the other beams of the plurality of beams, where the proportions reflect the average traffic loads within the beams.

25. The method of claim 1, further comprising:

transmitting user information via the shared communication channel and the first beam; and

concurrent with the transmission of the user information, if no demand for the shared channel exists in the second beam for a given time slot, transmitting the same shared data channel transmission in the second beam as in the first beam.

26. The method of claim 1, further comprising:

transmitting user information via the shared communication channel and the first beam; and

concurrent with the transmission of the user information, if no demand for the shared channel exists in the second beam for a given time slot, transmitting noise in the second beam using the orthogonal codes of the shared data channel unused by the first beam.

27. The method of claim 25, further comprising maintaining a transmit power associated with the first beam approximately equal to a transmit power associated with the second beam.

28. The method of claim 1, further comprising maintaining a transmit power associated with the first beam approximately equal to a transmit power associated with the second beam.

29. The method of claim 2, further comprising:

maintaining an approximately constant transmit power for the shared communication channel in the first beam; and

maintaining an approximately constant transmit power for the shared communication channel in the second beam.

30. The base station subsystem of claim 13, wherein the base station subsystem further comprises a plurality of weighters, wherein each weighter of the plurality of weighters is coupled to the processor and is further coupled to an array element of the plurality of array elements, and wherein the processor conveys a plurality of sets of weighting coefficients to the weighters, wherein a first set of weighting coefficients of the plurality of sets of weighting coefficients are utilized by the weighters to transmit via the first array element and wherein a second set of weighting coefficients of the plurality of sets of weighting coefficients are utilized by the weighters to transmit via the second array element.

31. The base station subsystem of claim 13, wherein the base station subsystem transmits user information via the shared communication channel and the first beam and, concurrent with the transmission of the user information, if no demand for the shared

channel exists in the second beam for a given time slot, transmits the same shared data channel transmission in the second beam as in the first beam.

32. The base station subsystem of claim 13, wherein the base station subsystem transmits user information via the shared communication channel and the first beam and, concurrent with the transmission of the user information, if no demand for the shared channel exists in the second beam for a given time slot, transmits noise in the second beam using the orthogonal codes of the shared data channel unused by the first beam.

33. The base station subsystem of claim 13, wherein the base station subsystem maintains a transmit power associated with the first beam approximately equal to a transmit power associated with the second beam.

34. The base station subsystem of claim 14, wherein the processor maintains an approximately constant transmit power for the shared communication channel in the first beam and maintains an approximately constant transmit power for the shared communication channel in the second beam.

9. EVIDENCE APPENDIX

No evidence has been submitted pursuant to 37 C.F.R. §§ 1.130, 1.131, or 1.132, nor has any other evidence been entered by the Examiner and relied upon by the appellant.

10. RELATED PROCEEDINGS APPENDIX

The appellant and appellant's representative know of no other appeal, interference, or judicial proceeding that may be related to, directly affect or be directly affected by, or have a bearing upon the Board's decision in the pending appeal.